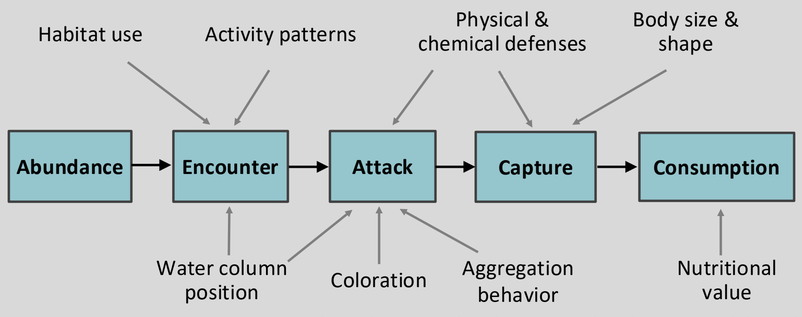
The pelagic species trait database: an open data resource to promote trait-based fisheries research

Miram Gleiber, Natasha Hardy, Alana Krug-Macleod, Zackary Tandy, Caitlin Morganson, Zachary Roote, Iris George, Cindy Matuch, Cole Brookson, Elan Portner, Anela Choy, Elizabeth Daly, Barbara Muhling, Steven Bograd, Elliott Hazen, Michael Jacox, Catherine Nickels, Brian Wells, Richard Brodeur, Toby Auth, Jarrod Santora, John Field, Larry Crowder, Stephanie Green

Why a trait database?

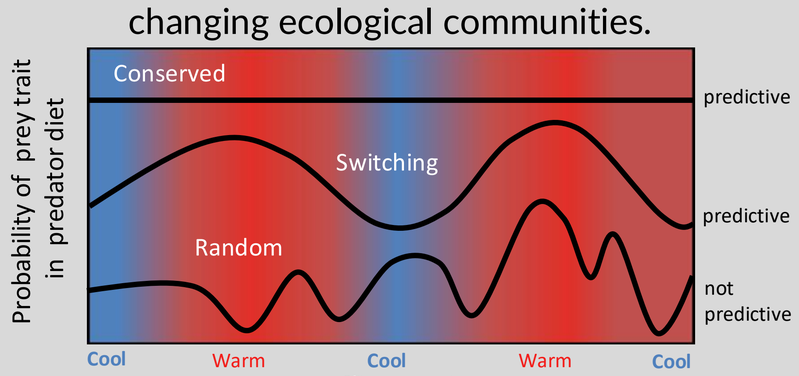
- Climate change alters marine food web structure globally, leading to species redistributions & decoupling predator-prey interactions.
- Shared traits can simplify complex species interactions and assist with predicting food web dynamics.

Habitat, behavior, morphology, and nutrition are key traits influencing prey vulnerability across the predation process.

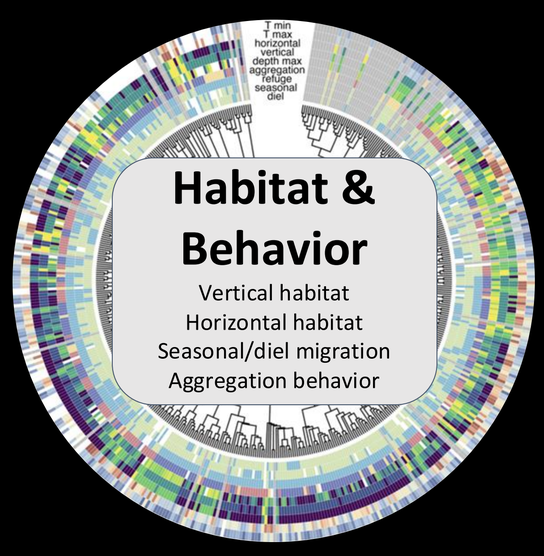


Lindardich, Brookson, Green (2021); Green et al. (2019); Green and Côté (2014)

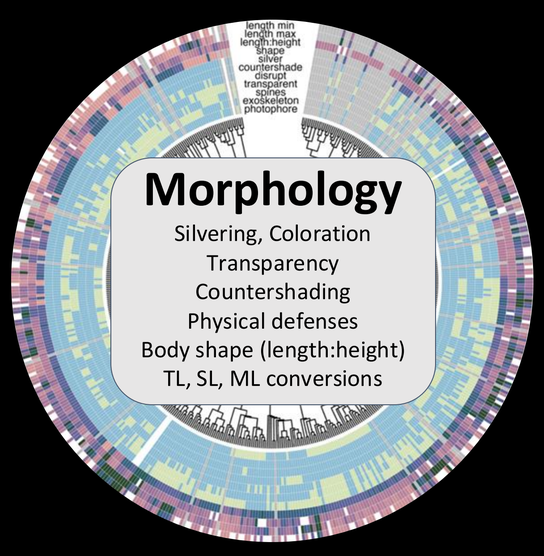
Trait-based approaches reveal food web dynamics beyond taxonomy, enhancing predictions in changing ecological communities.



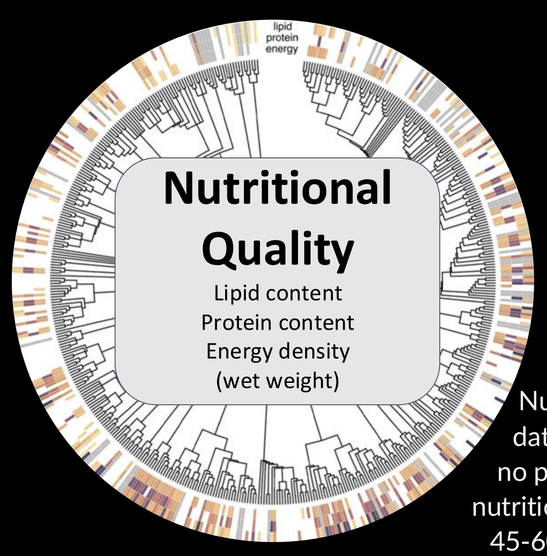
Explore the Pelagic Species Trait Database



Habitat & Behavior
Vertical habitat
Horizontal habitat
Seasonal/diel migration
Aggregation behavior

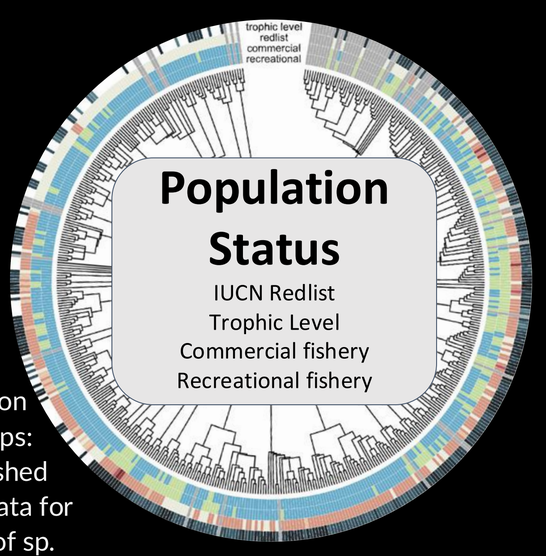


Morphology
Silvering, Coloration
Transparency
Countershading
Physical defenses
Body shape (length:height)
TL, SL, ML conversions



Nutritional Quality
Lipid content
Protein content
Energy density
(wet weight)

Nutrition data gaps: no published nutrition data for 45-60% of sp.



Population Status
IUCN Redlist
Trophic Level
Commercial fishery
Recreational fishery

Methods
- Primary literature search
- Online resources & databases
- Nutritional quality lab analysis
- Morphometric measurements

532 Species

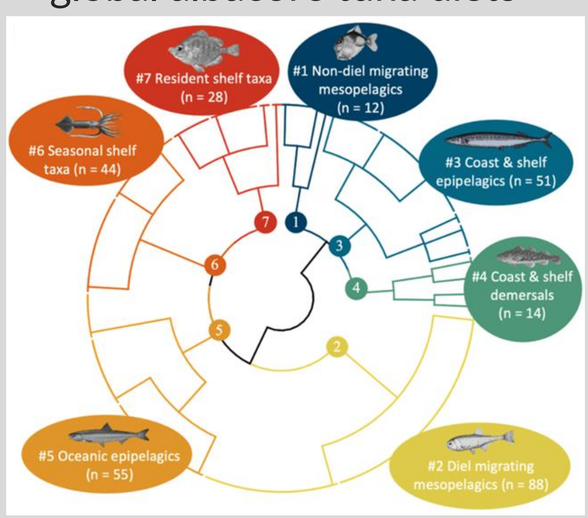
338 | 75 | 88 | 31

- California Current System (CCS) + prey for global ocean predators
- Stage-specific: adult, juvenile, larva
- Resources and protocols to guide expanded trait data collections

Gleiber et al. (2024), *Scientific Data*

Trait database supports climate-resilient fisheries research

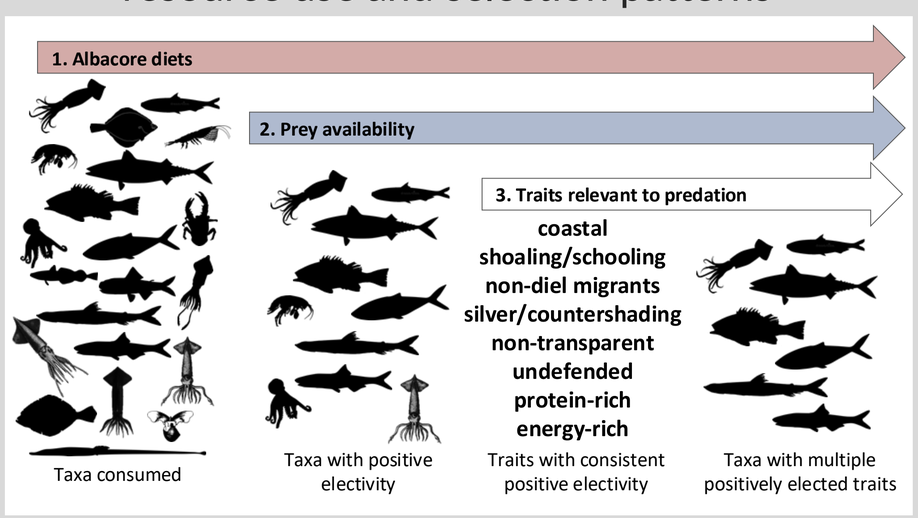
Trait-based patterns of global albacore tuna diets



Hardy et al (2023), *Fish & Fisheries*

- Global prey from four habitat traits for 300+ prey for albacore tuna
- Trait-based models outperform taxa models to explain diets

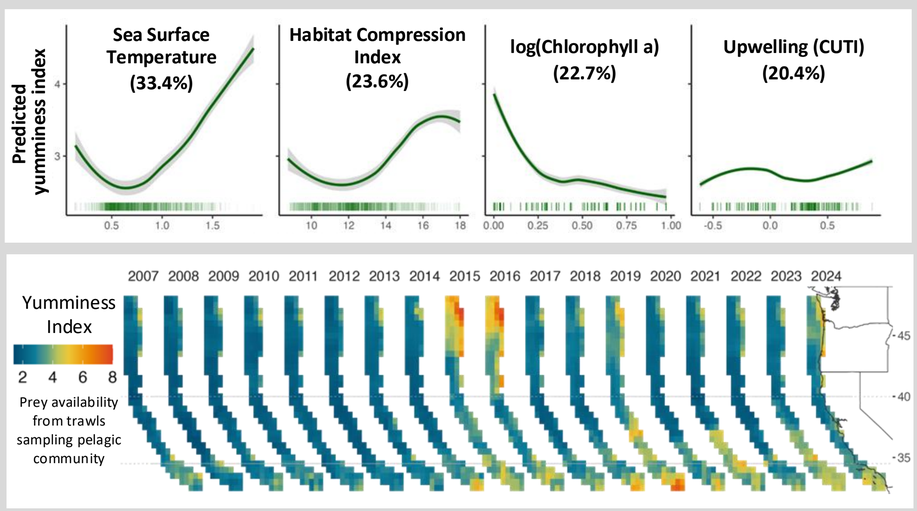
Traits simplify albacore tuna prey resource use and selection patterns



Gleiber et al (2024), *Ecological Indicators*

- 13 habitat, behavior, morphology, nutrition traits applied to CCS albacore diets and available prey community
- Albacore trait-based prey selection is conserved across years and regions

Identifying prey hotspots with the most suitable traits for albacore



Gleiber et al (*in prep*)

- Pelagic community scored based on total preferred traits for albacore tuna
- Yumminess Index = ∑ (# preferred traits x abundance)
- Predict preferred prey for albacore from environment

NEXT STEPS

- Forecast hotspots of preferred prey for albacore tuna in the NE Pacific into the future
- Test the performance of trait insights within existing food web model frameworks
- Develop indicators of predator resources for management
- Explore trait-based predator-prey interactions for other pelagic predators

LEARN MORE ABOUT TRAIT-BASED RESEARCH!

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